

ATTORNEY DOCKET NO. Q68466
PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Divisional Application of USSN: 09/858,723

Tetsunori MATSUSHITA

Appln. No.: NOT YET ASSIGNED

Group Art Unit: NOT YET ASSIGNED

Confirmation No.: NOT YET ASSIGNED

Examiner: NOT YET ASSIGNED

Filed: February 14, 2002

For: METHOD OF PREPARING PYRROLOTRIAZIN-4-ONE COMPOUND AND METHOD OF PREPARING ISOTHIOCYANATOFORMIC ACID ESTER DERIVATIVE THAT IS A REACTANT USED FOR PREPARING PYRROLOTRIAZIN-4-ONE COMPOUND

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Amend the specification by inserting before the first line the sentence:

This is a divisional of Application No. 09/858,723 filed May 17, 2001; the disclosure of which is incorporated herein by reference.

IN THE CLAIMS:

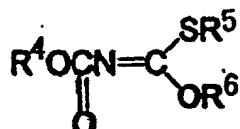
Please cancel claims 1-8 without prejudice or disclaimer.

Please enter the following amended claims:

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9. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing an intermediate represented by the following general formula (8); and

preparing the isothiocyanatoformic acid ester derivative from the intermediate:

ZNCS

General formula (5)

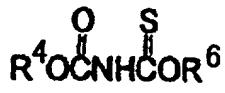
R⁶OH

General formula (6)

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General formula (7)

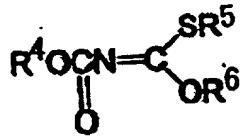


General formula (8)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom.

10. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and

preparing the isothiocyanatoformic acid ester derivative from the second intermediate:

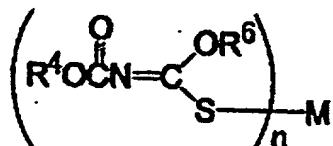
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General formula (8)



General formula (9)

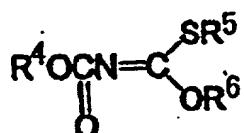


General formula (10)

wherein, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom.

11. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)

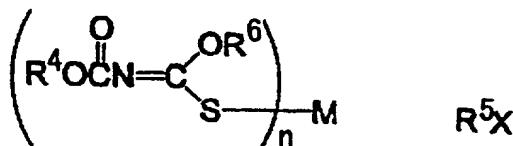


in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group;

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and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

preparing an intermediate represented by the following general formula (10); and
reacting the intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:



General formula (10) General formula (11)



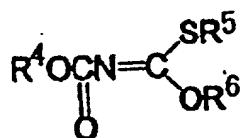
General formula (12)

wherein, in the general formula (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO₃Ar, and Ar represents a substituted or non-substituted aryl group.

12. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

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General formula (2)



in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and

preparing the isothiocyanatoformic acid ester derivative from the second intermediate:

ZNCS

R⁶OH

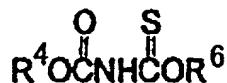
General formula (5)

General formula (6)

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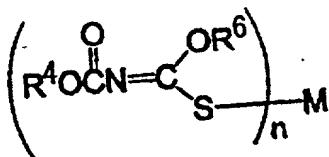
General formula (7)



General formula (8)



General formula (9)

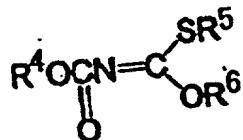


General formula (10)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, and, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom.

13. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)

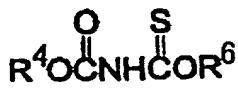


in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group;

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and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

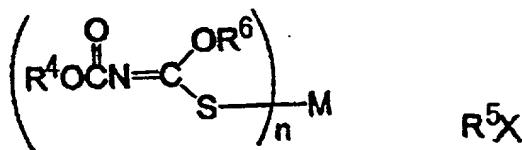
preparing a first intermediate represented by the following general formula (8);
preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:



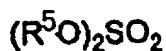
General formula (8)



General formula (9)



General formula (10) General formula (11)



General formula (12)

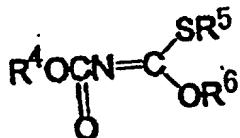
wherein, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X

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represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

14. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate; and

reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

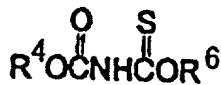
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ZNCS

R^6OH

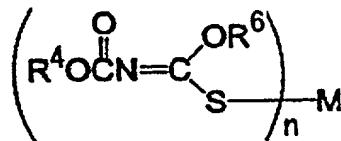
General formula (5)

General formula (6)

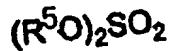


General formula (7)

General formula (8)



General formula (10) General formula (11)



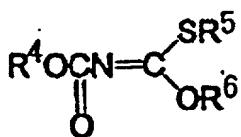
General formula (12)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, in the general formula (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

15. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

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General formula (2)



in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and

reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

ZNCS

General formula (5)

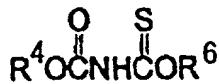
R⁶OH

General formula (6)

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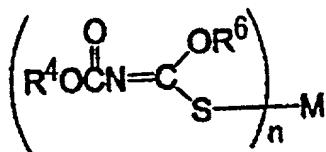
General formula (7)



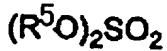
General formula (8)



General formula (9)



General formula (10)



General formula (11) General formula (12)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

REMARKS

Entry and consideration of this Amendment is respectfully requested.

Respectfully submitted,

Darryl Mexic Reg. No. 38,157

dm

Darryl Mexic
Registration No. 23,063

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Telephone: (202) 293-7060
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Date: February 14, 2002

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Amend the specification by inserting before the first line the sentence:

This is a divisional of Application No. 09/858,723 filed May 17, 2001; the disclosure of which is incorporated herein by reference.

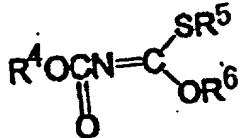
IN THE CLAIMS:

Claims 1-8 are canceled.

The claims are amended as follows:

9. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group the isothiocyanatoformic acid ester derivative according to claim 8, the method comprising the steps of:

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adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing an intermediate represented by the following general formula (8); and

preparing the isothiocyanatoformic acid ester derivative from the intermediate:

ZNCS

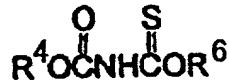
General formula (5)

R⁶OH

General formula (6)



General formula (7)

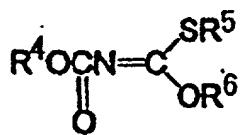


General formula (8)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom.

10. A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



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in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group ~~the isothiocyanatoformic acid ester derivative according to claim 8~~, the method comprising the steps of:

preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and

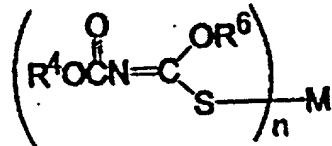
preparing the isothiocyanatoformic acid ester derivative from the second intermediate:



General formula (8)



General formula (9)



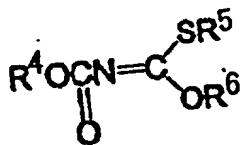
General formula (10)

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wherein, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom.

11. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

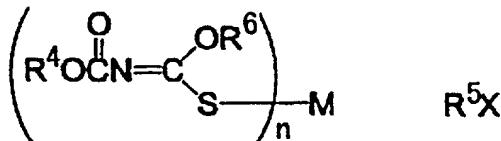
General formula (2)



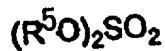
in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group the isothiocyanatoformic acid ester derivative according to claim 8, the method comprising the steps of:

preparing an intermediate represented by the following general formula (10); and reacting the intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

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General formula (10) General formula (11)

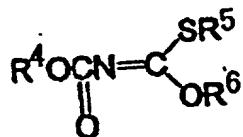


General formula (12)

wherein, in the general formula (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

12. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or

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a substituted or non-substituted aryl group the ~~isothiocyanatoformic acid ester derivative~~
according to claim 8, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to
an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy
derivative represented by the following general formula (6) for preparing a first intermediate
represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from
the first intermediate and a compound represented by the following general formula (9); and
preparing the isothiocyanatoformic acid ester derivative from the second intermediate:

ZNCS

General formula (5)

R^6OH

General formula (6)



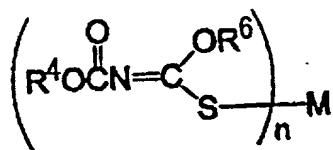
General formula (7)



General formula (8)

$M(OH)_n$

General formula (9)



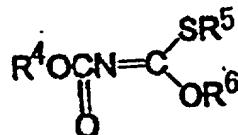
General formula (10)

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wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, and, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom.

13. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)

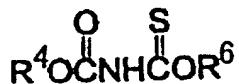


in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group the isothiocyanatoformic acid ester derivative according to claim 8, the method comprising the steps of:

preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

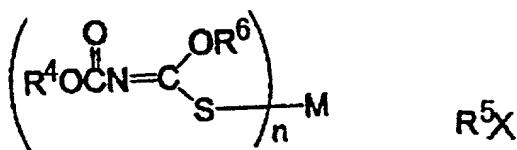
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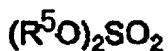
General formula (8)



General formula (9)



General formula (10) General formula (11)

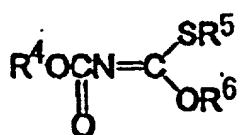


General formula (12)

wherein, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

14. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



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in which: R^4 represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R^5 represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R^6 represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group the isothiocyanatoformic acid ester derivative according to claim 8, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate; and

reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

ZNCS

R^6OH

General formula (5)

General formula (6)

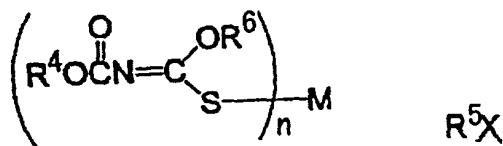
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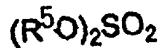
General formula (7)



General formula (8)



General formula (10) General formula (11)

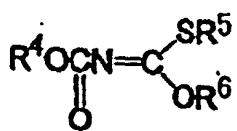


General formula (12)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, in the general formula (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.

15. (Amended) A method of preparing an isothiocyanatoformic acid ester derivative represented by the following general formula (2):

General formula (2)



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in which: R⁴ represents a substituted or non-substituted alkyl group, or a substituted or non-substituted aryl group; R⁵ represents a substituted or non-substituted alkyl group, a substituted or non-substituted aryl group, or a substituted or non-substituted heterocyclic group; and R⁶ represents a substituted or non-substituted alkyl group having at least 3 carbon atoms, or a substituted or non-substituted aryl group the isothiocyanatoformic acid ester derivative according to claim 8, the method comprising the steps of:

adding a chloroformic acid derivative represented by the following general formula (7) to an isothiocyanic acid salt represented by the following general formula (5) and a hydroxy derivative represented by the following general formula (6) for preparing a first intermediate represented by the following general formula (8);

preparing a second intermediate represented by the following general formula (10) from the first intermediate and a compound represented by the following general formula (9); and

reacting the second intermediate with an alkylating agent represented by one of the following general formula (11) and the following general formula (12) for preparing the isothiocyanatoformic acid ester derivative:

ZNCS

R⁶OH

General formula (5)

General formula (6)



General formula (7)

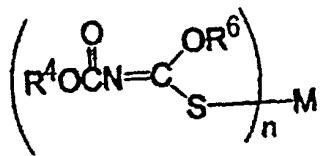


General formula (8)

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$M(OH)_n$

General formula (9)



General formula (10)

R^5X

$(R^5O)_2SO_2$

General formula (11) General formula (12)

wherein, in the general formula (5), Z represents a sodium atom or a potassium atom, in the general formulas (9) and (10), M represents an alkali metal atom, an alkali earth metal atom, an aluminum atom or a magnesium atom, and, in the general formula (11), X represents a halogen atom or SO_3Ar , and Ar represents a substituted or non-substituted aryl group.